Work force participation among elderly in India: How successful is the struggle for economic security

Antara Dhar
Research Scolar,
Economics Department, Calcutta University
antaraa.dhar@gmail.com

Zakir Husain
Associate Professor,
Indian Institute of Technology, Kharagpur
dzhusain@gmail.com

Mousumi Dutta
Associate Professor
Economics Department, Presidency University, Kolkata
dmousumi1970@gmail.com

Work force participation among elderly in India:
How successful is the struggle for economic security

Abstract

Given the failure of the state to ensure that the vulnerable elderly sections of the population is covered and disintegration of traditional family structures coupled with rapidly increasing dependency ratios, the labour market seems a possible tool to ensure security to the elderly. How well the labour market in India has succeeded in this front is analysed in this study. Unit level National Sample Survey data for the 55th (1999-2000) and 66th (2009-10) rounds are used.

Our analysis finds a decline in workforce participation rate among elderly. This is accompanied by a high level of informalisation of the aged workforce. This may be interpreted as a concerning sign, particularly if we view the informal sector as a traditional, low productive and stagnant sector. However, when we take into account the effects of rural growth and expansion of employment opportunities in the manufacturing sector, the decline in WFPR appears more as a deliberate withdrawal from the labour force, rather than forced unemployment. Moreover, recent studies have pointed out that the informal sector is not homogeneous, but may contain a highly vibrant and productive segment with close links to the formal sector. If, using their skill and experience, aged workers are able to secure work in these sectors the growing informalisation need not necessarily be alarming.

This possibility, however, should not let us to conclude that the condition of aged workers has improved. Analysis of occupational structure and earnings reveals that aged workers are employed in sectors that are typically low earning. Further, their own wages are lower than the low average earnings in these occupational categories. This remains a sign of concern that needs to be addressed by policy makers and studied by researchers.

1. INTRODUCTION

Population ageing is a phenomenon that occurs when the proportion of aged in the total population increases to over seven percent owing to reduction of fertility and mortality (Prakash 1999). United Nations projection indicates that the population aged 60 years and above will grow from an estimated 737 million older persons in 2009 to 2 billion in 2050 (UN 2009). In parti cular, the oldest-old group (those aged above 80 years) will grow faster than other age groups, and will comprise about a fifth of total elderly population by 2050. Although ageing emerged as an important issue in European and American countries (Anderson and Hussey 2000), in recent years it has become an important socio-demographic issue in Asia also (UN 2002). India is no exception to this trend, with the total number of elderly persons being expected to increase from 70.6 million in 2001 (6.9 per cent of population) to 173 million by 2026 (12.4 per cent of population) (Subaiya and Bansod 2011). Estimates by the Planning Commission (2011) indicate that, by 2050, one out of every five persons in India will be aged above 60 years. The increasing 'graying' of population impose a greater burden on social security, health services, housing and urban planning, and require fundamental changes in consumption and saving patterns. Increasing feminization of ageing is another major cause of concern in India (Alam 2009, Subaiya and Bansod 2011), as they often lack financial security and are dependent to a greater extent on other family members.

In India, the family has traditionally taken care of the elderly; the Maintenance and Welfare of Parents and Senior Citizens Act in 2007 also emphasized on familial care of the aged. The old-dependency ratio (number of aged as a ratio of total working population), however, is expected to rise in India (Subaiya and Bansod 2011). This will increase the pressure on the working population, particularly as more than half of the elderly people are fully dependent on others (Purohit 2008). Moreover, housing shortage, increasing trend towards nuclear families, shift from altruistic family-centric values to consumerism and individualism, greater mobility of workers, increasing work pressure and greater participation of women in economic activities is threatening inter-generational family bonds and reducing the support provided to aged relatives (Prakash 2005; Husain and Ghosh 2010; Raju 2011). While the Government has taken some measures to improve the socio-economic conditions of the economically vulnerable elderly in India—in the form of policies like *Annapoorna* and National Old Age Pension Scheme—these

policies fall far short of what is required (Purohit 2008). Given the need to control fiscal deficit, it is doubtful to what extent, the Government can scale up expenditure on social security to meet the needs of a population with an increasing share of ageing persons. Inadequate social security leads to financial distress which increases economic dependence of the elderly and deteriorates the health status (Alam and Karan 2011). Financial insecurity is found to be greater among the rural elderly, female elderly (particularly widows), aged residing in nuclear families or alone, and aged with health problems (Rajan et al. 2003).

Given the inability of both society and the state to ensure healthy ageing in India, the feasibility of market-based solutions has to be explored. In the long run, for instance, incentive to increase savings during the working period is a possible instrument. In the short run, however, participation of the elderly in the work force may enable them to be economically independent, particularly in view of its externalities. For instance, participation in economic activities has been observed to improve self-reported health status of the elderly (Husain and Ghosh 2010), and improve satisfaction of the elderly (Chang and Yen 2011). Simultaneously, complete retirement leads to increase in illness episodes and decline in mental health of the elderly (Dave et al. 2008), thereby reducing their well being (Stutzer, 2004). Given the inadequacy of social security, therefore, the labour force participation of elderly should receive more importance in order to understand their economic dependence (Rajan et al. 2003). Increasing participation of aged in the labour market, however, has not received its due attention as governments uses retirement as an instrument to provide more employment opportunities to the young (Salem 2008), even at the cost of increasing the proportion of elderly who are financially dependent on the state (Walker 1981).

Most of the research on elderly in India has tended to focus mostly on issues related to health, residential arrangement, social security and ill-treatment (Husain and Ghosh 2011; Alam and Karan 2011; Rajan and Mishra 2011). The few studies on work force participation of elderly in India have been essentially descriptive, describing trends in employment and wages (Rajan et al. 2003; Selvaraj et al. 2011). Analytical works are rare; so far we have been able to trace only works by Alam and Mitra (2012), Pandey (2009) and Singh and Das (2012).

This paper examines the changes in work-force participation rates and nature of employment (reflected in the extent of participation in the informal sector and occupational pattern) between 1999-2000 and 2009-2010. Data for these two years are available in the 55th and 66th rounds of National Sample Survey Organization survey on Employment and Unemployment. The choice of these two rounds enables us to examine changes that have occurred since the sweeping liberalization of the Indian economy between 1985 and 2000, culminating in the integration of the Indian economy with world markets. Using bivariate and econometric analysis we have tried to show that the aged workers have become increasingly vulnerable over the decade studied.

2. WORK FORCE PARTICIPATION AMONG ELDERLY IN INDIA

Rajan et al. (2003) on the basis of Census data have shown that work force participation (WFP) of elderly in India has decreased from 1961 to 1991, by 10 percentage points between 1961 and 1981, and by 1 per cent between 1981 and 1991 (Rajan et al. 2003). Further, WFP rate was higher in rural areas compared to the urban areas. Disaggregating by gender, they have found that elderly male participated more in economic activities than the female elderly. Further, elderly workers were increasingly involved in the agricultural sector with almost 80 per cent of the aged workers engaged in this sector in 1991. Among the male elderly, 62 per cent worked as cultivators, while among the female 70 per cent worked as agricultural labourers.

Selvaraj et al. (2011) have also analyzed the elderly WFP trend in India on the basis of usual activity status (usual principal status[1] and usual subsidiary status[2]) using NSSO data from 1983 to 2004-05. The total number of elderly workers in India was estimated to be 31 million in 2004-05; this is approximately 7 per cent of the total work force (Selvaraj et al. 2011). They have also shown that elderly WFP rate has decreased marginally from 42 per cent in 1983 to 39 per cent in 2004-05, mainly due to growing number of elderly in the higher age group who are less likely to participate in the work force. The WFP of elderly is higher in rural areas compared to urban areas. Further, the WFP declined sharply in urban areas from 31 per cent to 23 per cent in the same time period. In rural India, on the other hand, elderly employment shows a fluctuating

[1] If an individual is identified as a worker for the major part of the year, he/she is categorized as a worker on the basis of usual principal status.
[2] If an individual is identified as a worker only for a minor part of the year he/she is categorized as a worker on the basis of subsidiary status.

trend. It has been observed that elderly employment was higher in the pre-reform era (1983 to 1994), compared to the post reform period (1994 to 2005). However, the work participation of male elderly declined from 64 per cent in 1983 to 57 per cent in 2004-05 while female employment trend remains stagnant over time. WFP rate declined significantly for urban male (from 50.2 per cent in 1983 to 36.6 per cent in 2004-05) while for rural male it declines slightly (66.8 per cent to 64.4 per cent). WFP for rural females increased marginally from 22.6 per cent to 25.3 per cent, while WFP of urban females declined from 13.8 per cent to 10 per cent. Most of the elderly workers belong to the 60 to 69 years age group; analysis also reveals that work force participation decreases with increase in age. With the increase in age the number of female elderly workers declines faster than the number of male elderly workers.

Selvaraj et al. (2011) also reports that educational attainments of elderly workers is low—more than 70 per cent of elderly are illiterate, or do not have any primary education. This implies that it is economic vulnerabilities that 'forces' the aged to work in India. Among the female workers illiteracy is almost 93 per cent. However, the illiterate elderly workers are higher in rural areas compared to urban areas. Selvaraj et al. (2011) have also argued that labour force participation is higher among the poor elderly than the richer elderly. However, this difference is more marked among the female elderly workers. Most of the elderly workers are self employed, with the proportion of self employed elderly workers increasing with age. Casual employment is higher among the female elderly. In urban area, significant proportions of female elderly workers are engaged in regular employment. Selvaraj et al. (2011) on the basis of current weekly status[3] data of NSSO have also shown that real wage of regular and casual workers have increased by 60 per cent from 1983 to 2005. Although the elderly are receiving lower income than non-aged workers, their (aged workers') contribution to total household income is substantial, amounting to about 4 to 5 per cent on average.

Singh and Das (2012) have analyzed the determinants of old age wage labour participation and supply in India from 1993-94 to 2009-10 on the basis of current weekly status data of NSSO. They have analyzed the work participation of elderly on the basis of wage received by them. If an elder gets wage on any of the seven days in the week preceding the date of survey, then he/she

[3] It is the activity status obtaining for a person during a reference period of seven days preceding the date of survey.

is considered as a part of the labour force. They have considered weekly days of work of an elderly as a measure for weekly labour supply. Accordingly, if an elder works for full day, it was taken as 1 day and if an elder works for half day, it was taken as 0.5 day. They have taken age, square of age, marital status, sex, education, caste and religion, number of children (below 18 years), number of adults (18 years and above) in the household, amount of land cultivated in acres and monthly per capita expenditure etc as the determinants of wage labour participation. They have disaggregated the analysis on the basis of place of residence. The descriptive analysis shows that wage labour participation of elderly from 1993-94 to 2009-10 has decreased in urban areas (from 7.45 per cent to 6.01 percent) but has increased in rural areas (9.66 per cent to 11.35 per cent). But average weekly days of work supplied by the working elders has decreased in rural area (from 6.22 per cent to 5.80 per cent) but has remained same in urban area (6.42 per cent) (Singh and Das 2012). In rural area, the wage labour participation of Hindu elderly has increased over time but that of Muslim has decreased. Singh and Das (2012) reports that in rural area among the elderly workers agricultural and other labour has increased (from 83.6 per cent to 86.8 per cent) and in urban area the proportion of casual labour has increased (from 37.88 per cent to 41.07 per cent). The tendency for families to be nuclear is increasing in India and elders from small families are participating more in the work force (Singh and Das 2012). Econometric analysis using the probit regression model reports that in urban area there is negative relation between probability of wage labour participation and age of the elderly. In rural area only for the year 1993-94, they are having same result but for the 2009-10 they are getting insignificant relation. In rural area, schedule caste and schedule tribes and in urban area schedule caste are participating more than the others in 2009-10. In both the round, female are participating less than the male in rural as well as in urban area. They have found that both in rural and urban area, elderly from poorer households are having higher probability of wage labour participation in both the round. They report that education does not play any systematic role in wage labour participation, only in urban areas the participation of secondary and a higher educated person is significantly different from the illiterate. Like descriptive analysis in econometric analysis they have found elders from smaller families are more likely to participate. Using Heckman sample selection regression they have found that in 2009-10, in rural and urban areas the weekly days of work supply by the working population of the elderly does not have significant relation with their age. Singh and Das (2012) argued that in urban area schedule caste elderly shows a lower

weekly number of days of labour supply in 2009-10 compared to others. However, they have argued that in both the sectors, Muslim elderly are working more days than the Hindu elderly in 2009-10. In urban area, female elders work lower number of days compared to male elders in 2009-10. Education does not have any major significant effect on weekly days of work supplied in rural as well as in urban area in both the rounds. Elderly from smaller households are found to supply significantly lesser number of days of weekly work compared to larger families in both the rounds.

Rajan et al. (2003) have analyzed elderly WFP only in the pre globalization period. Although Selvaraj et al. (2011) have studied the WFP trend from 1983 to 2004-05, their study is limited to describing trends and has not undertaken any analytical work. Only the study of Singh and Das (2012) is analytical. But it suffers from some limitations.

1. For instance, they have used data on current weekly status which is not reliable as (say) principal status as the reference period is very small (week preceding the data of survey). Using current weekly status increases the probability of unemployment. A more reliable indicator regarding the presence in the labour market is principal status based on a reference period of 365 days preceding the survey.
2. Another limitation is that Singh and Das (2012) have considered only wage labour. But unpaid family labour is also important for aged workers. For instance, in the context of rural China, Pang et al. (2004) reports that the elderly tend to participate in the informal sector after withdrawing from the formal labour market. They report that about 62 per cent elderly and near elderly people in rural China are participating in informal sector, undertaking activities like household chores and taking care of grandchildren. To the best of our knowledge, there has been no similar study which has examined the extent of informalization among the elderly as a proxy of quality of employment in India

The present study aims to address these deficiencies. By using usual principal status data this study wants to analyze the elderly work force participation in India in recent years compared to the period just after globalization disaggregating the analysis by place of residence and gender and also wants to capture the extent of informalization of elderly in India.

3. DATABASE AND METHODOLOGY

3.1 Database

The two most important sources of data on work force participation rate in India are Economic Tables of the decadal Census and Employment and unemployment schedule of NSSO quinquennial survey. The last Census undertaken was in 2011. But as data on employment is yet to be released, latest Census data on employment is available for 2001. Further, Census does not provide data on informal sector. In contrast, NSSO provides unit level data and the availability of socio-economic information in the NSSO data allows for richer bivariate and multivariate analysis over socio-economic and demographic correlates. Moreover, NSSO provides information on informal sector. So, we use NSSO data even though it is based on a sample survey. This study uses data from the 55th round (1990-00) and 66th round (2009-10) surveys of NSSO on "Employment and Unemployment situation in India". The selection of these two rounds enables us to analyze changes in work force participation of elderly people following the second round of liberalization in the 1990s.

The sampling design adopted for the two surveys were essentially a stratified multi-stage one for both rural and urban areas. The surveys used the interview method of data collection from a sample of randomly selected households. The first stage units (FSUs) were villages (panchayat wards for Kerala) for rural areas and NSS Urban Frame Survey (UFS) blocks for urban areas. The ultimate stage units (USUs) were households. In the 55th round, data was collected for 7,00,934 individuals. Within this sample, 48,223 persons were aged 60 years and above. In the 66th round, data was collected for 4,59,784 individuals, among which there were 36,774 individuals aged 60 years or above. The following Table shows percentage distribution of elderly population by sex and place of residence in the 55th and 66th rounds. Table 1 reveals that the proportion of rural and urban elderly people increased marginally by 0.9 percentage point and 1.5 percentage points respectively over the study period. If we disaggregate the rural and urban population by gender, a similar marginal increase is observed.

Table 1: Percentage of elderly persons in population by place of residence and sex

Group	**1999-00**	**2009-10**
Rural male	4.49	4.80
Rural female	6.95	8.13

Rural	**7.10**	**8.00**
Urban male	6.01	7.51
Urban female	7.10	8.52
Urban	**6.50**	**8.00**

Source: Calculated from NSS 55th round and NSS 66th round

3.2 Some methodological issues

Two important macro measures of the decision to work are labour force participation rate (LFPR) and work force participation rate (WFPR). The LFPR of elderly people shows the percentage of elderly population that is in the labour force,[4] while the WFPR of elderly people indicates the percentage of elderly population that is in the work force.[5] Now, a person may be willing to work, but may not be able to find work (unemployed). In that case, the person is deemed to be part of the labour force, but not part of the work force. This creates a gap between the two measures. In both the rounds we have found that the number of unemployed elderly workers is minimal—only 12 (comprising 0.06 percent of the labour force) and only 35 (comprising 0.30 percent of the labour force) in the 55th and 66th rounds, respectively. The low rates of unemployment among the elderly is in keeping with studies reporting that if the aged do not secure work, they tend to withdraw from the workforce (Vodopivec and Arunatilake, 2008)—referred to as hidden unemployment (OECD, 2006). The marginal difference between LFPR and WFPR implies that it does not make much difference whether we look at the LFPR, or the WFPR. Given the trivial nature of the choice we focus on WFPR.

In the 55th and 66th rounds, the persons surveyed were classified into various activity categories on the basis of the activities pursued by them during certain specified reference periods. There were three reference periods for this survey. These are: (i) one year (ii) one week and (iii) each day of the reference week. Based on these three periods, three different measures of activity status are arrived at—usual status, current weekly status and current daily status.[6] Usual status is determined on the basis of the usual principal activity and usual subsidiary economic activity of

[4] Labour force includes persons who are working and those who are willing to work but may be currently unemployed.
[5] Work force includes persons who are currently working.
[6] This activity status for a person is determined on the basis of his/her activity status on each day of the reference week.

a person taken together. Usual status data is a better indicator regarding the presence in the labour market as it looks at the status of the person over a longer reference period. In the 55^{th} round and 66^{th} round on the basis of usual subsidiary status data we have found only 3.4 per cent and 5.6 per cent elderly people are employed. Such a small percentage is not helpful for meaningful analysis. So, we have taken only the usual principal status data for our analysis.

3.3 Econometric models

In this paper, in order to determine the influence of predictor variables on the WFPR of elderly by sex and place of residence, we have used the following model:

$$WFORCE = \alpha + \beta_1 AGE + \beta_2 AGE^2 + \beta_3 LPCME + \beta_4 LPCME^2 + \beta_5 ILLITERATE + \beta_6 BPRIMARY + \beta_7 MIDDLE + \beta_8 SECONDARY + \beta_9 HIGHER + \beta_{10} MUSLIM + \beta_{11} HSC + \beta_{12} HST + \beta_{13} OTHERS + \beta_{14} NORTH + \beta_{15} WEST + \beta_{16} EAST + \beta_{17} NEAST + \beta_{18} SOUTH + \beta_{19} UNEMP + \beta_{20} TIME \quad (1)$$

where

WFORCE = 1 if the respondent is a worker

= 0 otherwise

AGE = Age of the respondent

LPCME = Log of monthly per capita expenditure

ILLITERATE = 1 if the respondent is illiterate

= 0 otherwise

BPRIMARY = 1 if the respondent is below primary educated

= 0 otherwise

MIDDLE = 1 if the respondent is middle educated

= 0 otherwise

SECONDARY = 1 if the respondent is secondary educated

= 0 otherwise

HIGHER = 1 if the respondent is higher educated

= 0 otherwise

(PRIMARY, i.e. respondent has primary education, is taken as reference category)

MUSLIM = 1 if the respondent is a Muslim

= 0 otherwise

HSC = 1 if the respondent is a Hindu schedule caste

= 0 otherwise

HST = 1 if the respondent is a Hindu schedule tribes

= 0 otherwise

OTHERS = 1 if the respondent belongs to all others socio-religious identity

= 0 otherwise

(H-OTHERS, i.e. Hindu OBCs and forward castes, is the reference category)

NORTH = 1 if the respondent resides in North India

= 0 otherwise

WEST = 1 if the respondent resides in West India

= 0 otherwise

EAST = 1 if the respondent resides in East India

= 0 otherwise

NEAST = 1 if the respondent resides in North-east India

= 0 otherwise

(CENTRAL, i.e. respondent resides in Central India, is the reference category)

UNEMP = State level unemployment

TIME = 0 if data is for 66^{th} round (2009-10)

= 50^{th} round (1999-2000)

Here the dependent variable—whether the respondent is working or not—is binary. In case of a binary choice model we can use linear probability model (LPM), logit model or probit model. The fundamental weakness of LPM is its underlying assumption that the probability of the event occurring increases linearly with the level of regressor.[7] This restrictive assumption can be avoided if we use the logit or probit model.

Now, one possible problem with model (1) is endogeneity. We know that monthly per capita expenditure level influences the individual's decision to work. On the other hand, if a person participates in economic activities, his/her participation in the workforce increases household income, and hence expenditure. As this two-way relationship may lead to biased estimates if we use ordinary logit or probit model, we have estimated equation (1) accounting for endogeneity.

[7] This may result in values of probability greater than unity or less than zero. In addition, the assumption of homoscedasticity is often violated in LPMs.

To solve endogeneity problem, Arellano (2008) suggests a control function approach using two-step probit model.

Let the initial model be as follows:

$$Y = 1\ (\alpha + \beta X + U \geq 0)$$

$$X = \pi Z + \sigma_v V$$

$$\text{Here } \begin{pmatrix} U \\ V \end{pmatrix} | Z \sim N\left[0, \begin{pmatrix} 1 & \rho \\ \rho & 1 \end{pmatrix}\right]$$

In this model X is an endogenous explanatory variable if $\rho \neq 0$ and exogenous if $\rho = 0$. U is an error term which is correlated with X but not with the instrument Z. Further, E(U) = 0 and E(ZU) = 0. The two step estimation of the model is given below:

Step1: We have to obtain the OLS estimates ($\hat{\pi}$, $\hat{\sigma}_v$) of the first stage equation and then form standardized residual $\hat{v}_i = (x_i - \hat{\pi} z_i)/ \hat{\sigma}_v$, i= 1,2,…….N.

Step 2: Run an ordinary probit of y on constant, x, and $\hat{v}_i$ to obtain consistent estimates of the parameter.[8]

In our study, we have found that LPCME and WFPR are the functions of the following variables:

LPCME = f (WFPR, other explanatory variables)

WFPR = g (LPCME, $LPCME^2$, other explanatory variables)

Following the Arellano's control function approach we have to identify an instrumental variable (IV) that affects LPCME but not WFPR of elderly. In our model the instrumental variable is number of non-aged working members of the family. We first regress LPCME on the instrument and other variables. Based on this model, we estimate predicted residual and we form standardize residual (SRES). As WFPR is the function of LPCME and $LPCME^2$, we have calculated SRES

[8] The control function approach departs from the standard two stage model by regressing Y on standardized residuals, instead of regressing Y on predicted values of the instrument. Adopting the latter implies that our model will be:

$$Y = 1\ (\alpha + \beta(\hat{\pi} Z) + \varepsilon \geq 0)$$

where $\varepsilon \sim N(0, \sigma_\varepsilon^2)$ with $\sigma_\varepsilon^2 = 1 + \beta^2 \sigma_\varepsilon^2 + 2\beta\sigma_v\rho$

The problem is that, although it is possible to get consistent estimates of $\bar{\alpha} = \alpha/\sigma_\varepsilon$ and $\bar{\beta} = \beta/\sigma_\varepsilon$, we cannot obtain consistent estimates of α and β from the estimates $\bar{\alpha}$ and $\bar{\beta}$ as ρ is unknown (Arrelano, 2008: 5).

and square of SRES ($SRES^2$). We then estimate WFPR on SRES, $SRES^2$ (in place of LPCME and $LPCME^2$) and other variables to obtain unbiased consistent estimates. This model is estimated for only the age sample.

In order to determine the influence of predictor variables on the informal sector participation of the people, we have used the model:

$$IFS = \alpha + \beta_1 AGEDUMMY1 + \beta_2 AGEDUMMY2 + \beta_3 AGEDUMMY4 + \beta_4 TIME + \beta_5 NORTH + \beta_6 WEST + \beta_7 EAST + \beta_8 NEAST + \beta_9 SOUTH + \beta_{10} MUSLIM + \beta_{11} HSC + \beta_{12} HST + \beta_{13} OTHERS + \beta_{14} LPCME + \beta_{15} LPCME^2 + \beta_{16} ILLITERATE + \beta_{17} BPRIMARY + \beta_{18} MIDDLE + \beta_{19} SECONDARY + \beta_{20} HIGHER + \beta_{21} UNEMP \quad (2)$$

where,

IFS = 1 if the respondent participating in the informal sector

= 0 otherwise

AGEDUMMY1 = age of the respondent is 15 to 24 years

AGEDUMMY2 = age of the respondent is 25 to 49 years

AGEDUMMY4 = age of the respondent is 60 years and above

(AGEDUMMY3, i.e., the age of the respondent is 50 to 59 years, is the reference category)

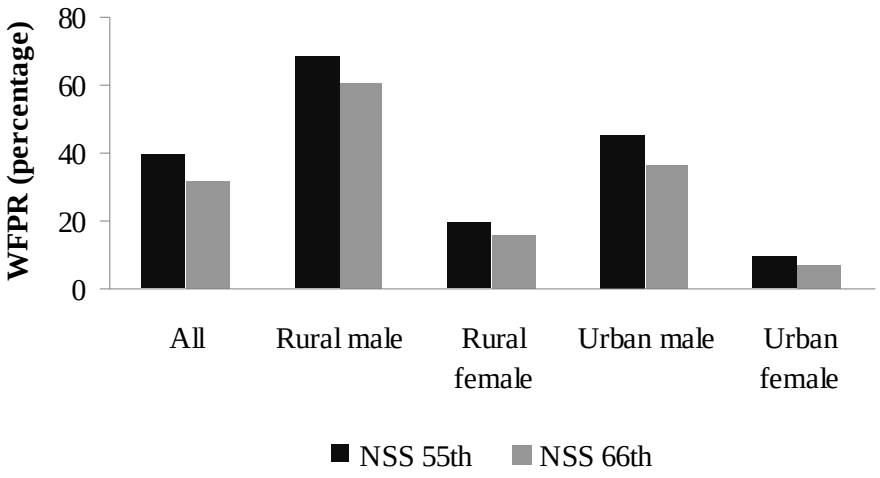
Other variables are same as (1). This model is estimated for the entire NSSO sample, comprising of both the aged and non-aged population.

4. RECENT CHANGES IN WFPR IN INDIA

In India the WFPR of elderly people in 1999-00 (55^{th} round) has decreased from 39 per cent (1999-00) to 32 per cent (2009-10)—a decline of 7 percentage points over the study period. Selvaraj et al. (2011) had argued that the declining trend in WFPR of elderly in India is due to decreasing WFPR among the urban elderly, who are less likely to participate in workforce. However, Figure 1 shows that WFPR has decreased for all the groups (rural male, rural female, urban male, urban female) over the study period. The greatest fall in WFPR is observed among the urban elderly male (a decline of nine percentage points) followed by rural male elderly (a

decline of eight percentage point). The least decline is observed among the urban female (a decline of two percentage points). Now is this decline the result of a deliberate withdrawal from the labour force, or can it be attributed to factors like declining job opportunities, poor health, lack of skills commensurate with modern production techniques, unfriendly public transport etc. (Pandey, 2009). In times of distress, both work participation of female, children and elderly people and unemployment increases as the demand for jobs increases at a higher rate than creation of job opportunities (Himangshu, 2011). Given that unemployment rate of elderly population is marginal in both rounds the declining WFPR is likely to be a result of a withdrawal of aged from workforce.

Figure 1: WFPR of elderly in the 55th and 66th round of NSS



Source: NSS 55th round and NSS 66th round

Now, the reduction in supply of labour from elderly may be a response to change in real earnings or due to general prosperity, particularly in rural areas. Abraham (2009) found that WFPR of the rural elderly people increased between 1999-00 and 2004-05 due to declining earning capacity of normal income earners. Over a longer time period (1999-00 and 2009-10), however, daily average real earnings of non-elderly people (both in rural and urban India) has increased.[9] This may be one of the reasons for the declining participation of elderly in rural and urban India. In particular, populist Government policies before the 2009 General Elections (like waiver

[9] Daily average real earnings of non elderly people increases from Rs. 87.73 in 1999-00 to Rs. 137.98 in 2009-10.

schemes) and the success of Mid Day Meal Schemes, MNREGA and Public Distribution System buffered the Indian economy from the adverse effects of global economic crisis on Indian economy and the 2009 drought (Himangshu, 2011; Khera, 2006, 2011).

4.1 Changes in WFPR across socio-economic strata

Obviously the socio-economic implications of a decreasing WFPR will depend upon which socio-economic stratum has experienced the greatest decline in WFPR over the two rounds. In this section, we analyze changes in WFPR across expenditure groups. In order to analyze the work participation of elderly belonging to different expenditure groups we have taken quintile divisions of monthly per capita expenditure. The five groups are labeled: Poorest, Poor, Middle, Rich and Richest. Table 2 shows that WFPR of rural males increases over quintile groups, while WFPR of remaining gender-residence groups (rural female, urban male and urban female) decreases. Results also reveal marginal changes in WFPR over the two rounds for most of the quintile groups. Only among rural males (top 20 percent) and urban males (top 40 percent) is the decline in WFPR greater than four percentage points.

Table 2: WFPR of elderly by expenditure group, sex and location of residence in 55th and 66th rounds of NSS (percentage)

	Round	Expenditure group				
		Poorest	**Poor**	**Middle**	**Rich**	**Richest**
Rural male	NSS 55th	56.9	59.8	63.5	64.9	65.8
	NSS 66th	57.6	60.7	61.4	63.6	58.6
	Difference	**0.8**	**1.0**	**-2.0**	**-1.4**	**-7.2**
Rural female	NSS 55th	17.1	16.1	15.8	15.3	13.4
	NSS 66th	15.0	15.3	15.4	17.8	14.4
	Difference	**-2.1**	**-0.9**	**-0.4**	**2.5**	**1.1**
Urban male	NSS 55th	45.0	44.0	40.1	39.0	32.3
	NSS 66th	43.0	44.0	38.8	33.3	28.3
	Difference	**-2.0**	**-0.1**	**-1.2**	**-5.7**	**-4.1**
Urban	NSS 55th	13.1	10.0	8.0	5.0	3.2

female	NSS 66th	10.2	10.7	8.4	5.1	3.1
	Difference	**-2.9**	**0.7**	**0.4**	**0.1**	**-0.1**

Source: Calculated from NSS 55th round and NSS 66th round

4.2 Econometric analysis

One limitation of the above analysis is the failure to control for variables like socio-religious identity, geographical zone of residence, and other determinants of work force participation. To remedy this deficiency we have estimated a regression model, using the methodology described in Section 3, to identify determinants of work force participation. Table 3 presents results of the regression model for determinants of workforce participation of rural male, rural female, urban male and urban female elderly. In all four models, the LR χ^2 statistic is significant at 1% level, indicating that the overall models are significant. The pseudo R^2 values show that all the independent variable explains 15 per cent, 12 per cent, 11 per cent and 34 per cent variations of the dependent variables for the rural male, rural female, urban male, and urban female elderly respectively. These are acceptable given that we are using cross-section data.

The dummy variable, TIME, is significant and negative for all the four groups. This indicates that the work participation of the elderly has decreased over the study period. As we have seen earlier, this may be explained in terms of effect of Government policies. The variable AGE and AGE square are significant only for male elderly in both rural and urban areas. The negative sign with respect to age and positive sign with respect to square of age implies that work participation of the rural and urban male elderly has an U-shape relation with age. An obvious explanation for this may be that WFPR has a floor, beyond which it cannot fall. The variable LPCME is significant at 1% level for all the four groups and the positive signs imply that workforce participation increases with increase in expenditure levels for all the groups. This implies that WFPR is lower for economically vulnerable respondents, which may be attributed to their poor health status (Alam and Mitra 2012). As expected, the relationship between the work participation and state level unemployment is negative. The sign (and statistical significance) of the coefficients of education dummies indicate that WFPR increases marginally for males and remains stable for females up to primary level, falling marginally thereafter. The drop in WFPR is substantial at the HIGHER level (corresponding to at least 12 years of schooling).

Table 3: Effects of predictor variables on workforce participation of elderly

Variable	Rural male	Rural female	Urban male	Urban female
TIME	-0.07***	-0.04***	-0.07***	-0.48***
AGE	-0.07***	0.01	-0.06***	0.01
AGE2	0.0003***	-0.0002***	0.0002***	-0.0001
LPCME	0.06***	0.02***	0.05***	-0.01***
$LPCME^2$	-0.01***	-0.002	-0.003	-0.002
UNEMP	-0.004*	-0.003***	0.002	-0.004***
Education level (Ref. Cat. PRIMARY)				
ILLITERATE	-0.08***	0.04***	-0.02	0.03**
BPRIMARY	-0.04***	0.02	-0.01	0.005
MIDDLE	-0.05***	-0.03*	-0.03*	-0.02
SECONDARY	-0.20***	-0.06***	-0.19***	-0.06***
HIGHER	-0.26***	-0.05*	-0.27***	-0.01
Socio-religious identity (Ref. Cat. HINDU OTHERS)				
MUSLIM	-0.02*	-0.05***	-0.03**	-0.04***
HSC	-0.05***	0.05***	-0.04***	0.06***
HST	0.001	0.07***	-0.11***	0.03
OTHERS	-0.03***	-0.01	-0.02	0.02
Geographical zone (Ref. Cat. CENTRAL)				
NORTH	-0.05***	-0.01	-0.02	-0.03**
WEST	-0.10***	0.10***	-0.07***	0.01
EAST	-0.14***	-0.08***	-0.12***	-0.02
NEAST	0.03	0.17***	-0.02	0.15***
SOUTH	-0.10***	0.10***	-0.09***	-0.03***
N	27891	25618	15346	8636
LR χ^2	5343.18***	2766.53***	2388.78***	2555.84***
PSEUDO R^2	0.15	0.12	0.11	0.34

Source: Calculated from NSS 55th round and NSS 66th round

Muslims and Hindu Scheduled Castes have a significantly lower WFPR than Upper Caste Hindus. Rural females belonging to the Scheduled Tribe community have a lower WFPR than their Hindu Upper Caste counterparts; this relation is reversed for urban males. WFPR in Central India tends to be higher than that in North, East, South and West; in contrast, WFPR in Central India is lower than in North-eastern India for females. This is possibly a result of the matriarchal nature of society in the latter region.

5. INFORMAL SECTOR AND THE ELDERLY

Analysis in Section 4 indicates that that the elderly belonging to low income households might not have been adversely affected by changes in economic conditions or in the labour market. However, before arriving at a firm conclusion, we must also examine the quality of employment. This is indicated by changes in the extent of informalisation and the occupational pattern.

5.1 Trends in informalisation

The concept of the informal sector was first propounded by the social anthropologist Keith Hart (1970), and popularized in the ILO report on employment in Kenya (1972). The informal sector comprises of the urban self-employed labour force and those engaged in household production enterprises. It is unrecognized by the Government, so that its economic activities are not included within national income statistics; nor is this sector subject to regulations or provided government support (De Soto, 1989), despite its substantial coverage. This makes entry or exit easy and imparts flexibility in the operation of informal sector units. While initial researchers equated the informal sector with traditional and low end technology, it has now been recognized that the informal sector is capable of evolution. In particular, globalization has resulted in economic integration of the formal and informal sector, resulting in emergence of a dynamic, high growing and profitable segment within the informal sector.

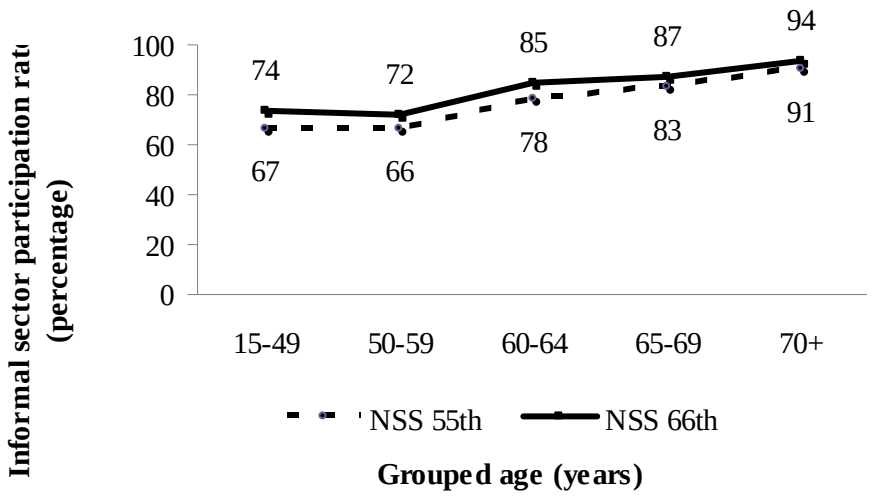
In India the informal sector is the largest employment providing sector (Shakthivel and Joddar 2006). Given that the population and workforce now contain a greater share of aged persons, we

would expect that the extent of informalisation will increase over time. As expected, we find that the proportion of workers aged 15 years and above engaged in the informal sector has grown from 67.59 per cent in 1999-00 to 74.57 per cent in 2009-10. Analysis of informal sector participation of the workforce[10] reveals a positive relation between age and informal sector participation in both rounds (Figure 2). This is not surprising, given that full time employment in the public sector is possible only up to 60, or at most 65 years. More important is the fact that informalisation has increased over the study period for *all* age groups. The increasing informalisation of the elderly workforce may simply be due to the increase in the number of workers aged above 65, or even 70, years. As avenues for employment in the formal sector is limited for such workers, increasing proportion of 'middle-old' (persons aged 70-80 years) in the population and workforce should result in an increase proportion of informal sector workers among the elderly. While data does show an increase in proportion of workers aged 65 years and above, it also reveals increasing informalization of workers in the 60-65 year bracket by about six percent. While this result may be attributed to jobless growth in the Indian economy squeezing out the elderly from the formal sector, such an explanation overlooks recent trends in employment in India. Studies report that, while the growth rate of organized sector employment declined from 0.4 per cent per annum during 1994-2000 to -1.1 per cent in 2004-05, it subsequently increased to 0.7 per cent in 2005-08 (Papola, 2013). Goldar (2011) found organized manufacturing sector to have increased at the rate of 7.5 per cent per annum between 2003-04 and 2008-09; similar findings have also been reported by Himangshu (2011). What is more likely, therefore, is that the increasing integration of the formal and informal sectors has led to creation of job opportunities and an increase in real earnings in the latter.[11] Given the easy nature of entry in to the informal sector labour force, this has led to aged workers from low income households flowing to this sector to augment household income.

Figure 2: Informal sector participation of different age groups in India in the 55th and 66th round of NSS

[10] A worker is said to work in the informal sector if: (1) (S)he is an own account worker or employer or helper in household enterprises; or (2) (S)he works in enterprises which do not u se electricity (or the electricity use is not known) and the number of workers in that enterprise is less than twenty; or (3) (S)he works in enterprises which use electricity but the size of workforce is less than ten.

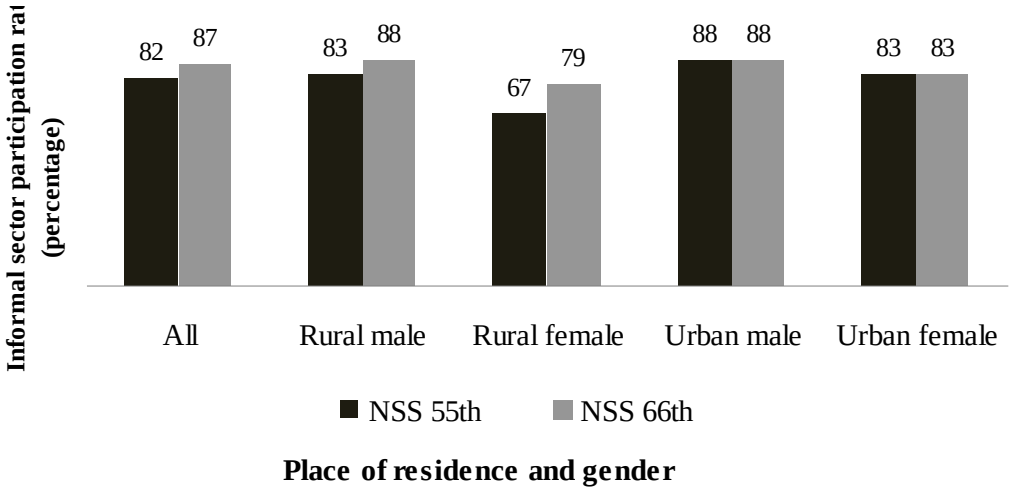
[11] Real earnings of aged in the informal sector have increased by 21 percent.



Source: NSS 55th round and NSS 66th round

Figure 3 presents the results of informalisation among the elderly workforce disaggregating by place of residence and gender. Given the disadvantaged position of women in the labor market in most parts of the developing world—the result of long-standing societal norms which discourage the social and economic integration and advancement of women—the majority of female workers are in the informal sector (UN 2000, Sethuraman 1998). This is also observed in India (Figure 3). We also find that informalisation has increased among rural male and rural female workers by 6 and 12 percentage points respectively. In contrast, the informal sector participation of elderly workers of either gender has remained about the same in urban area in both the rounds.

Figure 3: Informal sector participation of elderly in the 55th and 66th round of NSS



Source: NSS 55th round and NSS 66th round

Analysis of changes in level of informalisation among urban males by expenditure levels (Table 4) reveals a sharp increase in informalisation among the first three expenditure quintiles (bottom 60 percent of the sample) in rural areas. The trend is less clear in urban areas. Among male workers, informalisation has changed only marginally. The percentage of female workers engaged in the informal sector has increased by 10 percent in the top quintile. This may indicate a shift to household based part-time jobs by women from affluent workers. On the other hand, there has been a decline in share of women workers in the informal sector from the bottom quintile group. Given the vulnerability and poor health status of elderly women (Eapen, 2001), this may reflect their inability to continue working. Another possibility is that these women may shift to household activities like looking after their grand-children, cooking and similar chores, thereby facilitating the entry of younger and more productive women into the labour market.

Table 4: Informal sector participation of different age groups by expenditure level in the 55th and 66th round of NSS

Expenditure group	NSS 55th	NSS 66th	%age change	NSS 55th	NSS 66th	%age change
	Rural Males			Urban Males		
Poorest	70.13	78.61	12.1	82.77	85.00	2.7
Poor	75.17	84.81	12.8	90.08	85.82	-4.7

Middle	80.66	88.40	9.6	88.23	90.46	2.5
Rich	86.47	90.90	5.1	89.25	90.48	1.4
Richest	91.27	94.18	3.2	91.04	89.46	-1.7
	Rural Female			**Urban Female**		
Poorest	51.25	69.70	36.0	78.75	72.66	-7.7
Poor	61.60	75.82	23.1	82.83	88.28	6.6
Middle	65.82	77.13	17.2	84.27	81.36	-3.5
Rich	71.83	82.26	14.5	91.07	87.01	-4.5
Richest	83.47	86.01	3.0	82.28	90.57	10.1

Source: Calculated from NSS 55th round and NSS 66th round

5.2 Determinants of informalisation

Table 5 presents results of the probit model of determinants of informal sector participation for:

1. Model 1: Population aged above 15 years (that is, including both elderly and non elderly people) and
2. Model 2: Only for the aged workers.

In model 1, the coefficient of the dummy variable Time is significant and negative for rural male and female workers. Further, coefficients of the dummies of the 15-24 (new entrants) and 25-49 year age groups are negative. This indicates that informalisation has decreased among these two age groups vis-à-vis the near elderly workers who have remained stuck in the informal sector. Informalisation has also increased among the aged workers. The decline in participation of the younger segments of the rural workforce in the informal sector may reflect the success of social security programmes like Public Distribution System in reducing food insecurity (Khera, 2011), or the absorption of rural workers in National Rural Employment Guarantee Scheme (Himangshu, 2011). A series of good monsoon, the success of NREGA and the loan waiver schemes resulting in better access to credit resulted in agricultural growth between 2004-05 and 2007-08, increasing rural wages. The impetus of this growth persisted in 2009 and enabled the agrarian economy to tide over the drought. The favourable terms of trade, due to the onset of industrial recession, was another contributory factor (Himangshu, 2011). The resource flow to capture rural vote banks and loan waivers before the 2009 General Elections also operated to shelter the rural economy from any spill-over of the sub-prime crisis on the rural economy. Agrarian prosperity explains the withdrawal of the rural workforce from the informal sector.

In urban areas, on the other hand, the coefficient of the Time dummy is significant and positive for male and female workers, indicating an increase in informalization of the workforce in urban areas. While early researchers on the informal economy would view this as failure of the formal sector to absorb the 'reserve army' of surplus labour (Swaminathan, 1991), recent writers point out that the relation between the formal and informal sector need not necessarily be anti-cyclical, but may be pro-cyclical also Lubell (1991). Whenever the formal economy contracts, individuals become more involved in informal sector activities for lack of alternative ways of earning a living (anti-cyclical). On the other hand, whenever the formal economy expands, sub-contracting will expand the direct and indirect demand for goods and services produced in the informal sector. Given the growth of the manufacturing sector in the study period, it is likely that the expansion of the informal sector has been of the pro-cyclical nature. Fortuna and Prates (1989) also points out that a growth in exports—as witnessed in the study period—may lead to expansion of the informal sector disguised as small scale independent entrepreneurship. This is true for industries like leather products in India. Given the absence of labour laws and social security these enterprises are able to utilize the experience and skills of older workers, while economizing on costs by offering them wages below market rates.

Table 5: Effects of predictor variables on informal sector participation of the people

Variable	15 years and above population				60 years and above population			
	Rural male	Rural female	Urban male	Urban female	Rural male	Rural female	Urban male	Urban female
TIME	-0.02***	-0.09***	0.05***	0.06***	-0.03***	-0.03	-0.01	-0.08***
Age groups (Ref. Cat. 50-59 YEARS)								
AGE 15-24	-0.05***	-0.08***	0.11***	0.02**				
AGE 25-49	-0.03***	-0.06***	0.06***	0.01				
AGE 60+	0.14***	0.04***	0.21***	0.13***				
Education level (Ref. Cat. PRIMARY)								
ILLITERATE	-0.13***	-0.12***	-0.03***	-0.11***	-0.10***	-0.10***	-0.05***	-0.17***
BPRIMARY	-0.05***	-0.07***	-0.003	-0.03**	-0.02**	0.03	0.003	-0.04
MIDDLE	0.05***	0.05***	0.01**	0.00	0.02*	0.03	0.01	-0.06
SECONDARY	0.05***	0.07***	-0.03***	-0.12***	0.05***	-	0.03*	-0.38***
HIGHER	-0.003	-0.11***	-0.09***	-0.24***	0.01	-0.10	-0.01	-0.56***
Socio-religious identity (Ref. Cat. HINDU OTHERS)								
MUSLIM	0.02***	0.01	0.07***	0.07***	-0.02*	-0.15***	0.03***	0.02
HSC	-0.18***	-0.25***	-0.12***	-0.14***	-0.18***	-0.26***	-0.10***	-0.12***
HST	-0.05***	-0.05***	-0.14***	-0.14***	-0.04***	-0.09***	-0.05	-0.06

Variable	15 years and above population				60 years and above population			
	Rural male	**Rural female**	**Urban male**	**Urban female**	**Rural male**	**Rural female**	**Urban male**	**Urban female**
OTHERS	-0.02***	-0.03***	0.01*	-0.05***	-0.06***	-0.09***	-0.02	-0.16***
Geographical zone (Ref. Cat. CENTRAL)								
NORTH	-0.06***	0.16***	-0.04***	-0.08***	0.04***	0.18***	-0.03*	-0.01
WEST	-0.20***	-0.23***	-0.12***	-0.12***	-0.11***	-0.24***	-0.06***	-0.10***
EAST	-0.05***	-0.11***	-0.01**	-0.02*	-0.04***	-0.01	-0.06***	0.08**
NEAST	0.01**	0.12***	-0.03***	0.06***	0.07***	0.22***	-0.03	0.11***
SOUTH	-0.15***	-0.24***	-0.06***	-0.09***	-0.13***	-0.25***	-0.04***	-0.02
LPCME	1.05***	0.8***	0.16***	0.40***	0.33***	-0.15	0.21***	0.10
$LPCME^2$	-0.07***	-0.05***	-0.02***	-0.03***	-0.02***	0.03*	-0.01***	-0.003
UNEMP	-0.02***	-0.005***	-0.01***	-0.001	-0.01***	-0.003**	0.001	0.01
N	207446	77498	127942	27604	18249	4537	6368	1339
LR χ^2	23784.93***	15173.45***	8726.44***	2269.03***	2189.99***	985.93***	173.32***	139.24***
PSEUDO R^2	0.0970	0.1501	0.0563	0.0661	0.1406	0.1825	0.0379	0.1136

Source: Calculated from NSS 55th round and NSS 66th round

***, ** and * denotes significance at 1%, 5% and 10% levels, respectively.

Note: The variable SECONDARY for the rural female elderly predicts success perfectly. This variable is dropped in the result.

Regression results reveal that an inverse U-shaped relationship between education and informalisation. While Lubell (1991) had noted that informal sector workers in South Asia had very low levels of education, it appears that a new trend is emerging with the informal economy in India converging towards that of the South-east Asian economies.[12] Aged with middle and secondary level education may be able to secure jobs in the dynamic, productive and lucrative "upper-tier informal sector" (Fields, 1990; Charmes, 1998), while respondents with even higher education levels are able to access jobs in the formal sector. This may also explain the upward rising and concave curve denoting the informalisation-household expenditure level relationship.

One important finding is that, the workers from disadvantaged castes are participating less in the informal sector than the Hindu upper class. This may be because of reservation. However, the probability of a Muslim worker participating in the informal sector is significantly higher than that of a Hindu upper caste worker for all the sub-samples. This is in keeping with studies of the Muslim community (GoI, 2006). The only exception is rural female workers. This may be partly because of restrictions on their mobility.

Finally, we consider the results of Model 2 (the probit model of determinants of participation in the informal sector among elderly workers, also reported in Table 5). As the model is estimated for only elderly workers the age dummies are dropped from the model. Other variables are same as in Model 1.

The variable TIME is significant and negative for rural male and urban female at 1% level; it is statistically insignificant for rural female and urban male workers. This is in contrast to the results of the bi-variate analysis reported in Figure 3. In Figure 3 we had seen that informalisation had increased among rural elderly and remained same in urban areas. Econometric results are consistent with only the bivariate results for urban male workers. For the remaining three groups changes in the demographic and social structure may have masked the true change in informalisation. The coefficient is particularly high for urban females, indicating

[12] Lubell (1991) reported that informal workforce in South-east Asia generally ad secondary, or even tertiary, level of education.

that they have been the biggest losers. This may have happened because of the aged female are in a disadvantageous position to compete with other workers—both younger females and male elderly—who are more capable of adjusting themselves to the demands of the technology and organizational forms emerging in the informal sector (Jhabvala and Sinha 2002).

6. CHANGES IN OCCUPATIONAL STRUCTURE

Our analysis indicates so far that WFPR of the aged has decreased as a result of rural prosperity. The extent of informalisation, on the other hand, has either increased (in rural areas) or remained same (urban areas). Given that real earnings have increased in the informal sector this need not necessarily be an alarming development. But, before arriving at a conclusion on this issue, it is necessary to examine the occupational pattern of elderly workers. Two questions become important in this context: is there any substantial level of segregation in occupational choice between elderly and near elderly workers? The absence of segregation would indicate that workers are probably remaining in the same occupation after crossing 60 years. In the second step, we will identify the sectors where aged workers are concentrating and examine whether these are high earnings or low earnings sector.

6.1 Occupational segregation

Occupational segregation refers to the inequality in concentration of two groups (here elderly and near elderly) of workers in different occupational categories. Analysis of occupational segregation helps us to analyse objective and subjective status of aged workers and trace reasons for wage differences between aged and near aged workers. A commonly used measure of occupational segregation, suggested by Duncan and Duncan (1955), is:

$$D = \frac{1}{2}\sum_{i=1}^{n}\left|\frac{p_i}{P} - \frac{r_i}{R}\right|$$

When p_i is number of workers from the first group in i^{th} occupation, r_i is number of workers from the second group in i^{th} occupation, and P and R are the respective group sizes. D ranges from zero to one, with a higher value for the index shows a higher degree of segregation.

Given that D Is not sensitive to occupational distributions, Hutchens (2004) computes an laternative measure of segregation, called the `square root' segregation index. This measure

allows for additive decomposition of segregation, allowing us to define segregation as the summation of between group segregation and within group segregation. Let P_j be the number from social group A (elderly) in unit j and R_j be the number from social group B (near elderly) in unit j. P and R be the total number of observation in group A and B. The square root segregation index S is defined as

$$S= 1- \sum_j \sqrt{[\{P_j/P\}* \{R_j/R\}]} \qquad j = 1,2,\ldots\ldots J$$

Or equivalently

$$S= \sum_j C_j \quad \text{Where } C_j = R_j/R - \sqrt{[\{P_j/P\}* \{R_j/R\}]}$$

'S' represents the summation of each unit's shortfall from distributional equality. For each value of occupation, this shortfall is the difference between the geometric mean of the shares of individuals with different backgrounds characterized by group of age when there is no segregation, and the geometric mean of the actual shares.

Table 6 reports occupational segregation between the above two groups of workers, elderly and near elderly, in each round—disaggregating the sample by place of residence and gender. We present results for both the two-digit and three-digit classification systems. Changes are marginal—with an increases being observed in rural areas, and decrease in urban areas. The evidence suggests that aged workers continue to use their skills and experience by remaining in the same occupation after 'retirement'. Only, they tend to shift from the formal to the informal sector. Given that the latter is typically a unregulated sector, this would allow employers to exploit the skill and experience of elderly workers by offering them wages below the market rate.

Table 6: Occupational segregation between elderly and near elderly

Classification digit	Group	Duncan Index		Hutchens Index	
		NSS 55th	NSS 66th	NSS 55th	NSS 66th
2 digit classification	Rural male	0.18	0.23	0.03	0.05
	Rural female	0.04	0.07	0.01	0.02
	Urban male	0.27	0.27	0.06	0.06
	Urban female	0.25	0.23	0.08	0.07
3 digit	Rural male	0.21	0.24	0.06	0.06

	Rural female	0.08	0.09	0.03	0.03
	Urban male	0.39	0.31	0.15	0.10
	Urban female	0.34	0.30	0.16	0.11

Source: Calculated from NSS 55th round and NSS 66th round

6.2 Occupational structure and earnings

In the last step of our analysis, we have examined the occupational pattern of elderly sectors to identify sectors where they concentrate. We then estimate average earnings of *all* workers in each occupational category to find out whether the occupations where elderly workers concentrate are high earning or not. The Tables are reported in Appendix (Table A1-A4). In the top panels of the tables we have listed occupations (two digit NCO 2004 classification followed) where at least two percentage of the elderly workers are concentrated; this is followed by another panel, giving information for remaining occupations. Corresponding to each occupation we have given the proportion of *aged* workers and mean daily earnings of *all* workers.

Table A1 and A2 presents changes in occupational structure of aged workers in rural areas. Both male and female rural workers are predictably concentrated in the primary sector (83 and 85 percent workers respectively in 1999-2000). This is important as engagement in occupations in the primary sector, where food is directly produced, ensures a minimum level of security and protection against hunger. While the concentration in primary sector persists in 2009-10, the proportion of aged workers in such occupations decline by 10 and 7 percentage points, respectively. This implies an increase in vulnerability of elderly workers. In contrast, aged elderly workers in urban areas are found to concentrate in the service sector. Moreover, the change in occupational structure is about five percentage points for both male and female workers over the study period.[13] Another important point to be noted about the occupational structure is that most of the occupations where aged workers are concentrated are low-earning occupations. In the tables, the top ten earning occupations in each round are shaded grey. It is easy to see that very few of the occupations with more than two percent of the aged workers belong to the high earning categories. This is a concerning sign.

[13] The percentage of male workers in services has declined from 51 to 45 percentage over the study period. For female workers, corresponding figures are 60 and 55, respectively.

7. Conclusion

As developments in the health sector prolong the life cycle, the issue of meeting consumption and health needs of the aged increasingly becomes an important issue. In European and North America countries the emergence of the concept of welfare state has resulted in the creation of a social security system in many of these countries that ensures a minimum level of physical well-being to the elderly. Moreover, the realization that longevity is increasing has also led to changes in work and savings patterns that complements the efforts of the state. In developing countries, on the other hand, policies targeting elderly from low income households have failed to attain their objectives. This calls for other substitutes to protect the aged population from destitution and poverty. One such instrument is the labour market.

Our analysis finds a decline in workforce participation rate among elderly. This is accompanied by a high level of informalisation of the aged workforce. This may be interpreted as a concerning sign, particularly if we take the Lewisean view of the informal sector as a traditional, low productive and stagnant sector. However, when we take into account the effects of rural growth and expansion of employment opportunities in the manufacturing sector, the decline in WFPR appears more as a deliberate withdrawal from the labour force, rather than forced unemployment. Moreover, recent studies have pointed out that the informal sector is not homogeneous, but may contain a highly vibrant and productive segment with close links to the formal sector. If, using their skill and experience, aged workers are able to secure work in these sectors the growing informalisation need not necessarily be alarming. Unfortunately it is not possible to arrive at any conclusion on this count using NSS data. It is only research based micro-studies that can shed light on this possibility. This possibility, however, should not let us to conclude that the condition of aged workers has improved. There are two reasons for this.

Firstly, analysis of occupational structure and earnings reveals that aged workers are employed in sectors that are typically low earning. Further, their own wages are lower than the low average earnings in these occupational categories. This remains a sign of concern that needs to be addressed by policy makers and studied by researchers. In particular, the Oaxaca method (Oaxaca, 1973) can provide insights into the magnitude of discrimination and its trend over the study period.

Secondly, the 66th round provides data for 2009-10. The round is able to reflect the positive effects of loan waiver schemes, PDS, MNREGA and Mid Day Meal schemes. But it was at this time that the economy was entering into the doldrums. Inflation was entering into double digits, while industrial and overall economic growth would soon start its slump. This would be followed by troubles in the external sector—persistent Current Account deficit followed by a decline in Foreign Institutional Investment and devaluation of the rupee. All these are likely to have an adverse effect on the economy and the labour market. Extending the study period to the next major round is likely, therefore, to find the bell tolling for the elderly workers. In such circumstances, the market will become an unreliable substitute of government provided social security network unless compensatory policies are adopted.

One of the tenets of globalization was the increasing non-involvement of the state in the market and economy. This trend must not be confused with distancing the state from the social sector. The opening up of the economy to has led to structural changes that threatens the social fabric and increases vulnerability. The state must attempt to identify such threats and aim to protect affected sections of the population through carefully designed policies. This is also true for the increasing proportion of the aged population in India.

REFERENCES

Abraham, V. (2009) "Employment growth in rural India: Distress driven?", *Economic and political weekly*, XLIV (16): 97-104.

Adhikari, R. and Soonthorndhada, K. and Haseen, F. (2011) "Labor force participation in later life: Evidence from a cross-sectional study in Thailand", Available from http://www.biomedcentral.com/content/pdf/1471-2318-11-15.pdf [Accessed on 04/10/2013].

Alam, M. (2009) "Ageing, socio-economic disparities and health outcomes: Some evidence from rural India", *Indian Journal for Human Development*, 3(1): 47-76.

Alam, M. and Karan, A. (2011) "Elderly health in India: Dimensions, differentials and determinants", New Delhi: UNFPA, Working paper 3.

Alam, M. and Mitra, A. (2012) "Labour market vulnerabilities and health outcomes: Older workers in India", *Journal of Population ageing*, 5(4): 241-256.

Anderson, G. F. and Hussey, P. S. (2000) "Population aging: A comparison among industrialized countries", *Health Affairs*, 19(3): 191-203.

Auer, P. and Fortuny, M. (2000) "Ageing of the labour force in OECD countries: Economic and Social Consequences", Geneva: International Labour Organization, Employment paper.

Bhat, A.K. and Dhruvarajan, R. (2001) "Ageing in India: Drifting intergenerational relations, challenges and options", *Ageing and society*, 21: 621-640.

Blundell, R. Meghir, C. and Smith, S. (2002) "Pension incentives and the pattern of early retirement", *Economic Journal*, 112(478): 153-170.

Chang, H.H. and Yen, S.T. (2011) "Full time, part time employment and life satisfaction of the elderly", *The Journal of Socio-Economics*, 40(6): 815-823.

Dave, D. and Rashad, I. and Spasojevic, J. (2008) "The effects of retirement on physical and mental health outcomes", *Southern Economic Journal*, 75(2): 497–523.

Eapen, M. (2001) "Women in informal sector in Kerala, Need for re-examination", *Economic and Political Weekly*, XXXVI (26): 2390-2392.

Flores, M. and Kalwij, A. (2013) "What do wages add to the health-employment nexus? Evidence from older European workers", Available from http://ssrn.com/abstract=2236899, [Accessed 08/04/2013].

Focarelli, D. and Zanghieri, P. (2005) “Labour force participation of elderly workers in Italy: Trends, causes and policy issues”, *The Geneva Papers on Risk and Insurance - Issues and Practice*, 30(4): 711-723.

Gendell, M. (2006) “Full time work among elderly increases”, Available from: http://www.prb.org/Articles/2006/FullTimeWorkAmongElderlyIncreases[Accessed 11/03/2012].

Gendell, M. (2008) “Older workers: Increasing their labor force participation and hours of work”, *Monthly Labor Review*, 131(1): 41-54.

Goldar, B. (2011) “Growth in Organised Manufacturing Employment in Recent Years”, *Economic and political weekly*, XLVI (7): 20-23.

Government of India (2006) *Educational, Social and Economic Backwardness of Muslim Community in India; A report*. Prime Ministers High Level Committee: New Delhi.

Gruber, J. and Wise, D. A. (1999) “Social security programs and retirement around the world”, *Research in Labor Economics*, 18: 1-40.

Gruber, J. and Wise, D. A. (2004) “Social security programs and retirement around the world: Micro-estimation”, NBER, Chicago University Press.

Gupta, I. and Dasgupta, P. and Sawhney, M. (2001) “Health of the elderly in India: Some aspects of vulnerability”, *Quarterly Journal of the International Institute on Ageing*, 11(3): 1-26.

Haider, S. and Loughran, D. (2001) “Elderly labour supply: Work or play?”, RAND Corporation Publications department, Working Paper 01-09.

Himangshu (2011) “Employment trends in India: A re-examination”, *Economic and political weekly*, XLVI (37): 43-59.

Honig, M. and Hanoch, G. (1985) “Partial retirement as a separate mode of retirement behavior” *Journal of Human Resources*, 20: 21–46.

Hurd, M. and Rohwedder, S. (2011) “Trends in labor force participation: How much is due to changes in pensions?”, *Population Ageing*, 4(1-2): 81–96.

Husain, Z. and Ghosh, S. (2010) “Economic independence, family support and perceived health status of elderly: Recent Evidence from India”, *Asia-Pacific Population Journal*, 25(1): 47-77.

Husain, Z. and Ghosh, S. (2011) “Is health status of elderly worsening in India? A comparison of successive rounds of National Sample Survey data”, *Journal of Biosocial Science*, 43(2): 231-241.

Jhabvala, R. and Sinha, S. (2002) "Liberalisation and the woman worker", *Economic and political weekly*, XXXVII (21): 2037-2044

Johnson, R.W. and Kaminski, J. (2010) "Older adults' labor force participation since 1993: A decade and a half of growth", Available from: http://urbn.is/GCoHNX [Accessed 10/09/2013].

Khera, R. (2006) "Mid-Day meals in primary schools, Achievements and challenges", *Economic and political weekly*, XXXXI (46): 4742-4750.

Khera, R. (2006) "Revival of the Public Distribution System: Evidence and explanations", *Economic and political weekly*, XXXXIV(45): 36-50.

Lee, B. S. and Jang, S. and Sarkar, J. (2008) "Women's labor force participation and marriage: The case of Korea", *Journal of Asian Economics*, 19(2): 138-154.

Leslie, D. and Blackaby, D. and Murphy, P. and Leary, N.O. (2009) "The employment and earnings of Britain's senior citizens", *Economic Issues*, 14(2): 1-25.

Muszyńska, M.M. and Rau, R. (2012) "The old-age healthy dependency ratio in Europe", *Population Ageing*, 5(3): 151–162.

Pandey, M.K. (2009) "Labour force participation among Indian elderly: Does health matter?", ASARC, Working paper 2009/11.

Pang, L. and Brauw, A.D. and Rozelle, S. (2004) "Working until you drop: The elderly of rural China", *The China Journal*, 52 (July): 73-94.

Papola, T.S. (2013) "Economic growth and employment linkages, The Indian Experience", New Delhi: ISID, Working paper series 2013/01.

Planning Commission (2011) "A study of effectiveness of social welfare programmes on senior citizen in rural Rajasthan, Chhatisgarh, Gujarat", Available from: http:// www. planningcommission.nic.in [Accessed 10/04/2013].

Prakash, I.J. (1999) "Ageing in India", Geneva: World Health Organization.

Prakask, I.J. (2005) "Research agenda in gerontology". In Prakash, I.J. (ed) "Ageing in India: Retrospect and prospect", Bangalore: Bangalore University.

Purohit, B.C. (2008) "Policymaking for diversity among the aged in India", *Journal of Aging & Social Policy*, 15(4): 49-79.

Rajan, S.I. and Sarma, P.S. and Mishra, U.S. (2003) "Demography of Indian aging, 2001-2051", *Journal of Aging and Social Policy*, 15(2-3): 11-30.

Rajan, S.I. and Mishra, U.S. (2011) “The national policy for older persons: Critical issues in implementation”, New Delhi: UNFPA, Working paper 5.

Raju, S. Siva. (2011) “Studies on ageing in India: A review”, New Delhi: UNFPA, Working paper 2.

Raymo, J.M. and Xie, Y. (2000) “Income of the urban elderly in post reform China: Political Capital, Human Capital, and the State”, *Social Science Research*, 29(1): 1–24.

Salem, M B. and Blanchet, D. and Bozio, A. and Roger, M. (2008) “Labor force participation by the elderly and employment of the young: The case of France”, Available from: http://www.google.com [Accessed 27/09/2013].

Selvaraj, S. and Karan, A. and Madheswaran, S. (2011) “Elderly workforce participation, wage differentials and contribution to household income”, New Delhi: UNFPA, Working paper 4.

Singh, A. and Das, U. (2012) “Determinants of Old Age Wage Labor Participation and Supply in India: Changes over the Past Two Decades”, Available from: http://ssrn.com/abstract=2196183 [Accessed 27/03/2013].

Soneja, S. (2001) “Elder abuse in India: Country report for World Health Organization”, Available from: http://www.google.com [Accessed on 30/09/2013].

Stutzer, A. (2004) “The role of income aspirations in individual happiness”, *Journal of Economic Behavior and Organization*, 54(1): 89–109.

Subaiya, L. and Bansod, D.W. (2011) “Demographics of population ageing in India”, New Delhi: UNFPA, Working paper 1.

United Nations Population Division, (2002) “World population ageing: 1950-2050”, New York: UN Population Division.

United Nations Population Division, (2009) “Population ageing and development 2009”, New York: UN Population Division.

Vodopivec, M. and Arunatilake, N. (2011) “Population aging and labour market participation of old workers in Sri Lanka”, *Population Ageing*, 4(3): 141–163.

Walker, A. (1981) “Towards a political economy of old age”, *Ageing and Society*, 1(1): 73-94.

APPENDIX

Table A1: Occupational pattern of elderly workers and mean daily earnings in occupation—Rural Males

Concentration	Occupational category	Distribution of aged workers across occupation (%)		Mean earnings for all workers (Rs.)	
		1999-00	2009-10	1999-00	2009-10
High Concentration (≥ 2%)	**Market Oriented Skilled Agricultural and Fishery Workers**	67.1	59.8	51	7
	Agricultural, Fishery and Related Labourers	15.8	9.1	41	88
	Models, Sales Persons and Demonstrators	4.2	4.9	52	16
	Corporate Managers	2.2	4.7	161	22
	Labourers in Mining, Construction, Manufacturing and Transport	1.5	3.8	60	107
	Extraction and Building Trades Workers	2.0	3.7	73	101
	Subsistence Agricultural and Fishery Workers	0.0	3.2		15
	Other professionals	0.6	2.1	105	40
Low Concentration	Other Craft and Related Trade Workers	1.6	1.7	51	29
	Sales and Services Elementary Occupations	1.2	1.6	71	91
	Personal and Protective Service Workers	1.1	1.4	94	189
	Metal, Machinery and Related Trades Workers	0.4	0.8	84	125

Concentration	Occupational category	Distribution of aged workers across occupation (%)		Mean earnings for all workers (Rs.)	
		1999-00	2009-10	1999-00	2009-10
(< 2%)	Precision, Handicraft, Printing and Related Trade Workers	0.5	0.7	69	35
	Other Associate Professionals	0.1	0.4	165	248
Low Concentration (< 2%)	Machine Operators and Assemblers	0.7	00.4	63	112
	Teaching Associate Professionals	0.1	0.3	173	396
	Life Science and Health Professionals	0.3	0.3	297	227
	Teaching Professionals	0.1	0.3	199	474
	Drivers and Mobile-Plant Operators	0.1	0.3	93	113
	Office Clerks	0.2	0.3	127	350
	Stationary Plant and Related Operators	0.2	0.1	92	185
	Life Science and Health Associate Professionals	0.1	0.1	153	301
	Legislators and Senior Officials	0.0	0.1	241	433
	Customer Services Clerks	0.0	0.1	156	327
	Physical, Mathematical and Engineering Science Professionals	0.0	0.0	200	533
	Physical and Engineering Science Associate Professionals	0.0	0.0		198
	General Managers	0.0	0.0	167	355

Source: Calculated from NSS 55th round and NSS 66th round

Table A2: Occupational pattern of elderly workers and mean daily earnings in occupation—Rural Females

Concentration	Occupational category	Distribution of aged workers across occupation (%)		Mean earnings for all workers (Rs.)	
		1999-00	2009-10	1999-00	2009-10
High Concentration (≥ 2%)	**Market Oriented Skilled Agricultural and Fishery Workers**	**54.1**	**56.1**	33	3
	Agricultural, Fishery and Related Labourers	**31.1**	**19.2**	29	58
	Models, Sales Persons and Demonstrators	**3.4**	**4.0**	34	7
	Sales and Services Elementary Occupations	**2.6**	**4.0**	35	50
	Corporate Managers	**1.5**	**3.3**	53	7
	Other Craft and Related Trade Workers	**2.9**	**3.1**	27	16
	Subsistence Agricultural and Fishery Workers	**0.0**	**2.7**		9
	Labourers in Mining, Construction, Manufacturing and Transport	**0.8**	**2.6**	40	75
Low Concentration (< 2%)	Personal and Protective Service Workers	0.9	1.3	219	86
	Precision, Handicraft, Printing and Related Trade Workers	0.5	0.9	51	9
	Extraction and Building Trades Workers	0.1	0.9	40	67
	Other professionals	0.0	0.8	82	45

Concentration	Occupational category	Distribution of aged workers across occupation (%)		Mean earnings for all workers (Rs.)	
		1999-00	2009-10	1999-00	2009-10
	Machine Operators and Assemblers	1.6	0.7	38	38
	Life Science and Health Associate Professionals	0.1	0.2	135	264
Low Concentration (< 2%)	Other Associate Professionals	0.0	0.1	126	231
	Metal, Machinery and Related Trades Workers	0.0	0.1	57	42
	Teaching Associate Professionals	0.2	0.1	130	241
	General Managers	0.0	0.1		48
	Life Science and Health Professionals	0.0	0.1	224	270
	Drivers and Mobile-Plant Operators	0.0	0.1	57	114
	Stationary Plant and Related Operators	0.1	0.0	38	50
	Physical, Mathematical and Engineering Science Professionals	0.0	0.0	88	585
	Customer Services Clerks	0.0	0.0	150	194

Source: Calculated from NSS 55th round and NSS 66th round

Table A3: Occupational pattern of elderly workers and mean daily earnings in occupation—Urban Males

Concentration	Occupational category	Distribution of aged workers across occupation (%)		Mean earnings for all workers (Rs.)	
		1999-00	2009-10	1999-00	2009-10
High Concentration (≥2%)	Models, Sales Persons and Demonstrators	23.1	15.4	62	46
	Market Oriented Skilled Agricultural and Fishery Workers	15.7	17.8	82	27
	Corporate Managers	13.7	18.0	259	84
	Other Craft and Related Trade Workers	6.4	4.9	66	63
	Extraction and Building Trades Workers	5.6	3.7	89	128
	Labourers in Mining, Construction, Manufacturing and Transport	5.3	5.8	69	118
	Sales and Services Elementary Occupations	4.9	5.3	76	107
	Personal and Protective Service Workers	3.5	3.3	95	234
	Other professionals	3.3	7.9	186	95

Concentration	Occupational category	Distribution of aged workers across occupation (%)		Mean earnings for all workers (Rs.)	
		1999-00	2009-10	1999-00	2009-10
	Agricultural, Fishery and Related Labourers	3.0	4.9	68	102
	Machine Operators and Assemblers	2.3	1.0	79	181
	Metal, Machinery and Related Trades Workers	2.3	1.7	91	191
	Precision, Handicraft, Printing and Related Trade Workers	2.3	1.4	92	91
	Other Associate Professionals	1.7	1.5	187	325
Low Concentration (< 2%)	Office Clerks	1.4	1.3	146	399
	Drivers and Mobile-Plant Operators	1.4	1.2	106	167
	Life Science and Health Professionals	1.1	1.3	337	436
	Teaching Professionals	0.9	0.7	223	517
	Stationary Plant and Related Operators	0.6	0.1	116	368
	Teaching Associate Professionals	0.5	0.4	158	401
	Physical and Engineering Science Associate Professionals	0.4	0.2	213	505
	Customer Services Clerks	0.3	0.3	161	394
	Physical, Mathematical and Engineering Science Professionals	0.2	0.4	263	716
	Life Science and Health Associate Professionals	0.1	0.3	144	329

Concentration	Occupational category	Distribution of aged workers across occupation (%)		Mean earnings for all workers (Rs.)	
		1999-00	2009-10	1999-00	2009-10
	Legislators and Senior Officials	0.1	0.3	301	859
	General Managers	0.0	0.2		55
	Subsistence Agricultural and Fishery Workers	0.0	0.7		635

Source: Calculated from NSS 55th round and NSS 66th round

Table A4: Occupational pattern of elderly workers and mean daily earnings in occupation—Urban Females

Concentration	Occupational category	Distribution of aged workers across occupation (%)		Mean earnings for all workers (Rs.)	
		1999-00	2009-10	1999-00	2009-10
High Concentration (≥2%)	**Sales and Services Elementary Occupations**	**16.5**	**16.9**	45	73
	Market Oriented Skilled Agricultural and Fishery Workers	**11.6**	**16.4**	48	3
	Models, Sales Persons and Demonstrators	**17.1**	**12.6**	44	29
	Agricultural, Fishery and Related Labourers	**9.4**	**10.9**	31	64
	Corporate Managers	**8.9**	**10.0**	261	87

Concentration	Occupational category	Distribution of aged workers across occupation (%)		Mean earnings for all workers (Rs.)	
		1999-00	2009-10	1999-00	2009-10
	Other Craft and Related Trade Workers	**14.5**	**9.8**	31	18
	Personal and Protective Service Workers	**7.0**	**5.6**	61	106
	Other professionals	**0.1**	**4.9**	155	115
	Labourers in Mining, Construction, Manufacturing and Transport	**4.0**	**3.6**	44	78
Low Concentration (< 2%)	**Machine Operators and Assemblers**	**3.8**	**1.5**	38	55
	Extraction and Building Trades Workers	1.5	1.1	57	100
	Life Science and Health Associate Professionals	1.1	1.1	143	345
	Teaching Professionals	1.0	0.9	189	456
	Precision, Handicraft, Printing and Related Trade Workers	0.9	0.9	62	22
Low Concentration (< 2%)	Life Science and Health Professionals	0.3	0.9	311	453
	Teaching Associate Professionals	0.3	0.9	121	309
	Subsistence Agricultural and Fishery Workers	0.0	0.8		11
	Metal, Machinery and Related Trades Workers	0.3	0.4	81	157
	Stationary Plant and Related Operators	0.8	0.2	64.91837	112.85

Concentration	Occupational category	Distribution of aged workers across occupation (%)		Mean earnings for all workers (Rs.)	
		1999-00	2009-10	1999-00	2009-10
	Office Clerks	0.3	0.2	137	374
	General Managers	0.0	0.2		376
	Other Associate Professionals	0.6	0.0	190	361

Source: Calculated from NSS 55th round and NSS 66th round